

CLAIMS

1. A method of producing a reference image, comprising:

5 forming plural images by imaging a plurality of glass bottles as samples which may contain defective glass bottles by a CCD camera; and

 producing a reference image from the obtained plural images, a range of brightness when light is applied
10 to a non-defective glass bottle being specified in said reference image.

2. A method of producing a reference image according to claim 1, wherein said range of brightness
15 specified in said reference image is determined by grasping brightness in each pixel in the images of plural non-defective glass bottles, and determining the maximum brightness and the minimum brightness in each pixel, and said range of brightness is between the maximum brightness
20 and the minimum brightness.

3. A method of producing a reference image according to claim 1 or 2, wherein plural images are formed by imaging a glass bottle as one sample simultaneously by a
25 plurality of CCD cameras from a plurality of imaging angles, and said reference image is produced in each predetermined angle.

4. A method of producing a reference image according to any one of claims 1 through 3, wherein before producing said reference image, images of defective glass bottles are removed from said plural images imaged by said
5 CCD cameras, and only the images of non-defective glass bottles are obtained.

5. A method of producing a reference image according to claim 4, wherein frequency distribution of
10 brightness of pixels located at the same position of said plural images is obtained, an average value and standard deviation of brightness of said pixels are calculated, and when there is at least one pixel having brightness higher than said average value by a predetermined multiple of said
15 standard deviation or more, an image having said at least one pixel is judged to be an image of a defective glass bottle and then removed.

6. A method of producing a reference image
20 according to claim 4, wherein frequency distribution of brightness of pixels located at the same position of said plural images is obtained, an average value and standard deviation of brightness of said pixels are calculated, and when there is at least one pixel having brightness lower
25 than or equal to a value calculated by subtracting a predetermined multiple of said standard deviation from said average value, an image having said at least one pixel is judged to be an image of a defective glass bottle and then

removed.

7. A method of inspecting a glass bottle,
wherein a defect at a specific part of a glass bottle is
5 detected by comparing the reference image obtained by the
method according to any one of claims 1 through 6, with an
image which is formed by imaging the glass bottle to be
inspected by a CCD camera.

10 8. An apparatus for producing a reference image,
comprising:

a CCD camera for forming plural images by imaging
a plurality of glass bottles as samples which may contain
defective glass bottles; and

15 an image processor for producing a reference
image from the obtained plural images, a range of brightness
when light is applied to a non-defective glass bottle being
specified in said reference image.

20 9. An apparatus for producing a reference image
according to claim 8, wherein said range of brightness
specified in said reference image is determined by grasping
brightness in each pixel in the images of plural non-
defective glass bottles, and determining the maximum
25 brightness and the minimum brightness in each pixel, and
said range of brightness is between the maximum brightness
and the minimum brightness.

10. An apparatus for producing a reference image according to claim 8 or 9, wherein plural images are formed by imaging a glass bottle as one sample simultaneously by a plurality of CCD cameras from a plurality of imaging angles, and said reference image is produced in each predetermined angle.

11. An inspecting apparatus for detecting a defect of a glass bottle by imaging light from the glass bottle while the glass bottle is illuminated, and processing the obtained image, the inspecting apparatus comprising:

a lighting disposed at a predetermined position with respect to the glass bottle;

a plurality of CCD cameras disposed around the glass bottle for imaging a specific part of the glass bottle; and

an image processor for processing the images obtained by said CCD cameras;

wherein said image processor detects a defect at a specific part of the glass bottle by comparing the reference image obtained by said apparatus according to any one of claims 8 through 10, with an image formed by imaging the glass bottle to be inspected by said CCD camera.